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ABSTRACT

IN THIS STUDY, REPRESENTATIONAL THOUGHT, WHICH INVOLVES THE CHILD'S ABILITY TO FUNCTION IN TERMS OF NONPRESENT REALITY, IS VIEWED WITHIN A COGNITIVE-DEVELOPMENTAL FRAMEWORK. TO SEE IF DISADVANTAGED CHILDREN WOULD FUNCTION IN THE SAME WAY AS ADVANTAGED CHILDREN ON TASKS WHICH REQUIRED REPRESENTATIONAL THOUGHT RATHER THAN VERBALIZATION, CHILDREN WERE TESTED ON PICTURE-OBJECT MATCHING TASKS, SPATIAL ARRANGEMENT TASKS AND IN STRUCTURED PLAY SITUATIONS. THERE WERE AN EQUAL NUMBER OF 4- TO 5-YEAR-OLD BOYS AND GIRLS IN EACH GROUP. SCORES INDICATED THAT THE DISADVANTAGED GROUP GENERALLY DID NOT PERFORM AS WELL AS THE ADVANTAGED CHILDREN ALTHOUGH THERE WAS MUCH VARIATION AMONG INDIVIDUALS TESTED. DISCUSSION OF STUDY FINDINGS INDICATE THAT PRESCHOOL PROGRAMMING SHOULD ENCOURAGE REPRESENTATIONAL FUNCTIONING BECAUSE IT IS AN IMPORTANT ASPECT OF THE CHILD'S COMPREHENSION AND USE OF LANGUAGE, AND BECAUSE IT PLAYS A CENTRAL ROLE IN THE CHILD'S OVERALL COGNITIVE DEVELOPMENT. (AUTHOR/NH)

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A Study of Non-verbal Representation in Young Children[1]

Margery B. Franklin, Ph.D.

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A child is asked to draw a picture of a person, and does so. A child is down on all fours, moving stealthily across the room -- saying "meow, meow." A child molds little pieces of play-doh into lumps, lines them up, and pushes them along, saying "choo-choo." He looks at a spiral pattern drawn on paper, and says "You know, this could be a snail." In the doll-corner of a classroom, a child silently picks up a doll, rocks it in her arms, places it in a crib. Another child picks up a flat disk of wood, places it on a table, puts some beads on it, and sits down to "dinner."

What do these examples have in common? They illustrate imagination, play, pretending. But -- more specifically -- each of these events can be seen as an instance of representational functioning. In some examples, the child is enacting movements, sounds, behaviors that are understood (by him and by the observer) as those of another creature, not himself. In other examples, the child is relating to patterns and objects not in terms of what they are as things-in-themselves -- pieces of play-doh or pieces of wood or lines on paper -- but as standing for something other, that which they are intended to be in the process of imagination.

How we interpret such behaviors, and what significance we attribute to them, clearly depends on the theoretical framework that we bring to bear in looking at the phenomena of child development. The discussion that follows, and the study that I am going to report, are within a "cognitive-

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developmental" framework, the viewpoint best known through the works of Piaget (1950, 1951) and of Heinz Werner (1957a, 1957b).

For these theorists, representational thought -- which first appears at the close of the sensory-motor period (a period which extends from birth to approximately 18 months) -- heralds the beginning of a new era. In the sensory-motor period, the child is more or less limited to direct action upon things immediately present; most important, his behavior towards the world is organized exclusively in terms of action schemata. But then something new happens. The child begins to function at times in terms of non-present reality. He engages in what Piaget terms "deferred imitation"; that is, the child enacts or plays out a scene that he has witnessed at some previous time (Piaget reports that his daughter enacted, on a later occasion, a friend's fit of temper -- but without herself being angry); he shows the first beginnings of symbolic play (Piaget's daughter uses a cloth as her pillow in a game of going-to-sleep).

This is only the beginning. The child's comprehension of his world, the creation of his experience, his ability to function in a world of planned action and contemplative thought -- all this rests, in part, on the development of representational thought. If we enter into the world presented to us by such theorists as Piaget, we see that everyday life -- for the adult, as well as for the child -- is permeated by opportunities for (and the necessity of) representational functioning. Just consider: The role of mental imagery in memory and imagination; the processes involved in understanding pictures, maps, diagrams; the use of miniature toys in dramatic play; the ability to comprehend and to engage in role-taking play.

Representation has two faces, two aspects. On the one hand, it is a mode of functioning in which materials or givens are responded to not merely as things-in-themselves, but as pointing beyond themselves to something other (as referring, as signifying). Responding to something as a representation is not to treat it in terms of its properties as a thing of action or perception. For example: (1) if we are totally concerned with the two-dimensional design properties of a pattern, we do not see that pattern as a picture of a dog, or -- another instance -- as a map of Utah; (2) if we are absorbed with a ball as something to throw and bounce, we do not at the same moment see it as a model of the planet Jupiter. This does not mean that the properties of the object are irrelevant in representation; a good many representational relationships are mediated by similarities between the object and that which it "stands for": the spherical shape of the ball makes it work as representation of a planetary body; a map maintains some of the relationships of the "reality" which it charts. When we construe something as a representation, we see through it -- as it were -- to that which it signifies. But, on the other hand, we do not respond to representations as if they were actually the things which they stand for. This is the other face of representation: representations are not stand-ins, not total substitutes, for the real thing. We do not try to walk into a scenic picture, nor do we recoil in real-life terror from men carrying guns on-stage. Children do not actually eat the pebbles they are pretending as food; they do not try to sit down in the tiny dolls' chairs. (And if they do, they're not functioning in the representational mode or, perhaps, they are in a transitional phase.)

We are emphasizing the shift from sensory-motor to pre-operative or symbolic functioning, attempting to characterize and illustrate what is

meant by representational functioning. But we do not mean to suggest that a child who has emerged from the sensory-motor period sees <u>everything</u> as a representation. To do so would be as maladaptive as failing to do so altogether.

Now, the question: If we agree with Piaget and Werner that representational functioning is an "open sesame" to the world of genuine thought -- that it is a necessary, if not a sufficient, condition for the ultimate development of operational intelligence -- then it follows that in attempting to understand the cognitive differences between "disadvantaged" and "advantaged" children, one should take a close look at representational functioning. Although there has been a massive amount of research on cognitive functioning in so-called disadvantaged as compared with advantaged youngsters, there has been relatively little which is concerned with representational functioning per se. The work of Irving Sigel and his associates (1966, 1967) is an exception to this generalization.

In a series of studies, Sigel studied children's classifications of common three-dimensional objects and life-sized colored photographs of the objects. He found that lower-class children had more difficulty than middle-class children in classifying the photographs, and that their categorizations of representations (i.e., the photographs) were not consistent with their object classifications. In interpreting such findings, Sigel speaks of "representational competence," which he defines in terms of "the individual's capability to respond appropriately to external representations, to behave in terms of internal referents, to re-construct non-present reality." (1968)

The aim of the study I am about to report was to see if "disadvantaged" children -- on the whole, and keeping individual differences in mind --

would function in the same way as "advantaged" children on different types of tasks which have in common the necessity for representational thought, and which do not explicitly require verbalization.

We had two groups of subjects -- 16 "advantaged" and 15 "disadvantaged." I use these terms with caution, putting them in quotes to indicate my reservations. Because I wanted to view my findings in the context of other research comparing so-called "disadvantaged" and "advantaged" (or middle-class) preschoolers, I employed the same type of selection criteria that have been used in other studies. I want to say that I am deeply concerned with the question of what we mean by "disadvantaged" -- both for purely conceptual and for social-political reasons. There is an important discussion of this problem in a volume issued by the U.S. Government Printing Office, entitled "Perspectives on Human Deprivation."

The subjects for the "advantaged" group were drawn from private nursery schools in New York City; the subjects for the "disadvantaged" group from preschool programs -- also in New York City -- funded by O.E.O. Children on large scholarships were excluded from the "advantaged" sample, and children whose parents' income was above the "poverty level" were excluded from the "disadvantaged" sample. The average age, at time of testing, was 4:6, and the spread of ages in the two groups was the same (from 4 to 5). There was an equal number of boys and girls in each group.

The children were tested on a series of non-verbal representation tasks, specifically designed for this study. There were three types of tasks: Picture-Object matching tasks, Spatial Arrangement tasks, and Structured Play situations. Each child was taken out of the classroom for individual testing.

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In the Picture-Object matching tasks, the child is given a bag with 5 objects in it (5 cars, or 5 horses, or 5 men, or 5 brushes), and is asked to take them out. He is then given a small black-and-white photograph of one of the objects, and is asked to indicate which object is shown in the picture. A simple demonstration item is presented prior to the tasks proper; this is to provide a means of knowing whether the child understands the instructions. The child need not say a word to solve the problem.

In the Spatial Arrangement problems, the experimenter arranges a small set of blocks, and the child is requested to "do what I'm doing; put your blocks the same way." These tasks, too, are preceded by a simple demonstration item, to make sure the child understands the intent of the instructions.

In the Structured Play situations, the child is presented with an array of materials, and is asked to play out a simple situation -- (1) "Could you pretend, make believe, that you are in the kitchen, fixing something to eat?" and (2) "This is a street. Could you pretend, make believe, that there is a fire in one of the houses?"

Why these tasks, rather than some other? I wanted to set up situations that would require the child to utilize his "representational competence," in Sigel's terms. At the same time, I was concerned with presenting materials and situations that were familiar to preschool children, and that were close to everyday experience, to "real life." I hoped that these tasks would be interesting to children, that they would not seem arbitrary or artificial. Generally speaking, this was in fact the case. We did everything we could to avoid a "test atmosphere" and we did not test children who were averse to leaving the classroom, nor complete testing on children who became very uncomfortable in the testing situation.

What did we find out? The distribution of scores for the Picture-Object matchings and the Spatial Arrangements are shown in the Table (see attached sheet). For both sets of tasks, the differences between groups are statistically significant.[2] The disadvantaged children, as a group, do not perform as well as the advantaged children on these tasks.

When we look at performance in the Structured Play situations, we find the following: (1) the majority of subjects in each group use the materials representationally -- although many of them do not follow the instructions. In some of the play situations, these materials are "unrealistic" rather than being miniature toys (the "unrealistic" materials are wooden forms of various shapes and sizes). The children in the disadvantaged group are somewhat less inclined than the middle-class children to use such "unrealistic" materials representationally; (2) the representational play in the advantaged group is somewhat more elaborated and differentiated than that in the disadvantaged group; (3) furthermore, the advantaged children engage in considerably more verbal description of what they are doing. (I should say at this point that full tape-recordings and observational notes of each session were kept.)

The between-group differences (advantaged vs. disadvantaged) on the Picture-Object matchings and the Spatial Arrangements are clearcut. There are differences, too, in the Structured Play situations, with the advantaged children "out-performing" the disadvantaged in terms of our criteria. We have tried to make sure that these differences do not have to do with the ability to understand the instructions. (The use of demonstration

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2. The differences were assessed by the Mann-Whitney U (Siegel, 1956), and are significant at less than .05 level.

items was for this purpose.) But: in addition to overall group differences, there is a marked overlapping of distributions. Some advantaged children are "low scorers"; some disadvantaged children are "high scorers." This heterogeneity within groups -- while not surprising -- is as significant as any other finding (in terms of thinking about similarities and differences between these two populations). Also, there is a high degree of individual variation: while the majority of children tend to be moderately consistent in their performance (in terms of being "good performers" or "not-so-good performers"), some of them complete one task with apparent ease and seem at a total loss in another.

How are such findings to be interpreted?

Focusing on the differences between groups (advantaged vs. disadvantaged) and the fact that the advantaged children do "score" higher in terms of pre-established criteria (i.e., correctness of choice in the Picture-Object matching, accuracy in copying E's model in the Spatial Arrangements, elaboration and differentiation in Structured Play situations), I could say that the disadvantaged children have less "representational ability" than the advantaged children. This may, in fact, be the case. But, of course, problems of interpretation are complex. Drawing such a conclusion assumes that we have managed to cut through, to see through, the child's performance in this situation to the actual ability or competence that is presumed to underlie performance.

As we all know, the child being tested is not the pure cognitive creature that we might want him to be when we try to assess his cognitive ability. Performance reflects underlying ability or competence -- but rarely in a one-to-one fashion. Whether or not a child brings his ability or

understanding to bear in a particular situation obviously depends on a multitude of factors.

One group of such factors -- often (and perhaps erroneously) categorized as non-cognitive -- have to do with the child's attitudes and feelings in the ongoing situation. Such things as: anxiety, ease in the testing situation, feelings about the experimenter, whether he has to go to the bathroom, etc. The problems of assessing the operation of such factors in evaluating test results have been discussed in an important article by Fishman and others (1964).

Another group of factors -- somewhere on the borderline between cognitive and non-cognitive -- have to do with the specific ways in which a child approaches or attacks a problem-solving situation. Such things as: How directed is he towards meeting the requirements of the task, in accepting the instructions as a framework within which to work? In other words, does he comprehend and accept the "rules of the game"? How interested is he in the materials? How active is he in relation to the task? (That is, for instance, how curious and exploratory? Does he pick up the materials? Does he scan objects carefully, look back and forth between the experimenter's model and that which he is constructing?)

We have attempted to assess factors such as these, but our analysis is still in process. In any event, we are convinced that the investigation of performance on cognitive tasks should involve consideration of the complexities, the many determinants, of behavior at any given moment -- and that any inferences about underlying ability should take such factors into account.

Suppose that we acknowledge that variations in underlying ability do not wholly account for performance, and suppose further that we attempt to

investigate these other determinants of performance. Have we solved our problems? Not entirely. The particular ability on which we are focusing (in this case, representational ability) may not be the only -- or even the most crucial -- cognitive ability involved. This is not a problem that can be answered entirely by experimentation. The question is one of theoretical conceptualization. Someone else might look at the kinds of phenomena I described initially and interpret them in terms of habit-formation rather than within a "cognitive-developmental" framework. However, taking the view that the tasks I have designed require, or call into play, representational functioning, we must also recognize that other abilities or operations are involved as well. Matching pictures to objects, and duplicating spatial arrangements, probably involve some differing cognitive operations as well as some that are the same (i.e., a fundamental ability in representation). Engaging in play -- and on request, at that -- calls into operation a host of factors.

So, you may well ask me, what conclusions do I draw from my findings? Most conservatively, I would say that there seems to be considerable individual variation in four year olds' ability to deal successfully with the kinds of tasks that I have presented. But there is also evidence that -- as a group -- the "disadvantaged" children are less successful in this endeavor than the "advantaged" children. The qualitative analysis of behavior in the testing situation ("emotional" and quasi-cognitive components), taken in conjunction with other findings (and the findings of other researchers and observers; cf. Mattick, 1965) leads me to believe that -- in fact -- the representational mode, as a way of relating to materials and situations, a way of experiencing, is less dominant or prevalent in "disadvantaged" children. I am not saying that the disadvantaged child

lacks this mode of orientation towards the world, nor am I asserting at this point that he has "less" of the ability -- representational competence. But -- to repeat -- that there is evidence that he tends not to use such ability as often, or in as differentiated and functional a fashion, as his middle-class counterpart. Such a statement could be rephrased in terms of differences between individuals, rather than in terms of differences between groups or "populations." Clearly, it is not poverty per se that accounts for differences in cognitive ability or in performance on cognitive tasks; rather it is specific factors (perhaps specific kinds of experience) that may be differentially present or operative among different groups of people. Sigel (1968) has offered some interesting and provocative hypotheses concerning the specific factors that may contribute to the development of representational competence -- but I am not going to go into these at the moment.

There has been a tendency among psychologists to interpret many of the differences between advantaged and disadvantaged in cognitive functioning in terms of language. Although our tasks do not require verbalization on the part of the child, and the role of verbal understanding of instructions has been minimized through the use of demonstration items, might it not be that it is differences in language ability, in verbal mediation, that account for the between-group differences that we have found?

I cannot give an unequivocal answer to this question. Our data do include information on verbal responsiveness, and there is a basis for saying that in our sample, the advantaged children tend to be more verbal. On the Picture-Matching, for instance, we asked the child "How can you tell?" We classified the responses as: verbal-specific ("his leg is up"),

verbal-global ("it looks the same"; "it's the same color"), non-verbal-specific (pointing), non-verbal-global (pointing), and no response. The advantaged children give more verbal responses, and within that category, a higher proportion are verbal-specific. However, there are many correct choices even when the question went unanswered ("no response") or where the response is non-verbal; there are also incorrect choices where verbal-specific responses are given to the question. No response, or a non-verbal response, does not mean -- of course -- that the child is not verbalizing to himself. We have no way of knowing this.

The fact that in situations such as these there may be a gross overall correlation between verbalization and problem-solution (or correct choice) does not mean, a priori, that language is indeed the causal base, the actual mediator for correct solution. To quote from one Piagetian (Sinclair-de-Zwart): "Language as seen by Piaget is...part of a much larger complex of processes that go on during the second year of life; it has the same roots, and in the beginning the same functions as symbolic play, deferred imitations and mental images; it does not appear ex nihilo (nor simply from early pre-linguistic vocalizations) but partakes of the entire cognitive development of this crucial period." It is the advent and development of representational thought that is seen as underlying both the emergence of genuine language (as distinct from parroting or simple verbal imitation) and of symbolic play, etc.

In fact, I might insert here that it was my interest in the differences between advantaged and disadvantaged children in the area of linguistic functioning that led me to pursue the study of non-verbal representational functioning.

Now, we may consider briefly the question of implications for preschool programming. A great deal of the programming in compensatory education has been geared towards the development of specific skills, often with an emphasis on language (cf. Brottman, 1968). The emphasis on language can derive from any one of a number of ideas: (1) linguistic proficiency is necessary for academic survival -- even in first grade; (2) language is the principal means of communication -- between children, and between children and adults -- for both the transmission of information and for the development and conduct of interpersonal relations; (3) language is a principal tool for self-expression, and thus for the development of self-awareness; (4) language plays an important -- or, a critical -- role in conceptualization. It seems to me that all of these ideas can be defended as valid. But the assumption that training in language per se will lead to the desired ends has to be questioned. I am suggesting that more attention should be given to the general area of representational functioning -- not only because, in my view, such functioning constitutes an important aspect of the comprehension and use of language, but because it plays a central role in the overall cognitive development of the child.

But what should we do? Can we <u>teach</u> representational functioning to children?

I have to repeat that I do not think of representational ability as a specific skill, but as a mode of relating to objects and situations. Therefore, I am wary of suggesting that highly specific training techniques would be advantageous. In general terms, however, I would say that if teachers are aware of -- or believe in -- the importance of this mode of functioning, they will find ways of providing the child with opportunities

to bring this mode of functioning into play, and will encourage him in this endeavor. As it becomes appropriate, they will help him to begin to think metaphorically. Sonquist, Kamii and Derman (1968) have made some suggestions for classroom activities geared towards developing the child's representational ability. They discuss: (1) gestural imitation, and the use of objects ("Show us what you do with this" (e.g., a spoon); (2) the use of objects in games ("The teacher can create an environment so that the child will use a block as a 'car,' line up chairs to make a 'train,' and pretend in his socio-dramatic play that pegs and beads are food); (3) the construction of three-dimensional models (including the use of blocks); (4) the making and recognition of objects in pictures.

While specific "games" and activities can be developed, perhaps the most important thing that a teacher can do is to become "cued in" to representational functioning, so that -- as I suggested before -- she can encourage such functioning within the context of the child's spontaneous activity. Without becoming intrusive in regard to the child's play or other activity (such as drawing), she can encourage him to become aware of the kinds of similarities that are important in representation (e.g., relationships between parts), and can enhance his spontaneously developing understanding of the signifier-signified relationship. I know that this is more easily said than done!

Because "disadvantaged" children seem to show less inclination than do some middle-class children to engage in socio-dramatic symbolic play, the teacher of such children may have to rethink her relation to the child's activity, taking a more active role in initiating symbolic play, "priming the pump" so to speak. The recognition (or belief) that play constitutes a crucial area for cognitive development (cf. Almy, 1968), and

is not merely a channel for emotional expression -- an idea denied by Bereiter and Engelmann (1966) -- extends the rationale for emphasizing this aspect of preschool programming. Clearly, the time has passed when we can simply assert that what we are doing (or not doing) facilitates (or fails to facilitate) cognitive development. Psychologists and educators alike have to think about the processes of cognitive development in an increasingly "fine-grained" manner. In addition, we must face up to the challenge of evaluating our programming in meaningful ways -- and, in my opinion, we should not settle for elevations in IQ as the prime indicator of growth or "improvement." My own interest and research is in the area of cognitive development, but in closing, I want to say that to focus on cognitive development to the exclusion of other aspects of development will not only result in a limited view but will prevent us from attaining that which we are presumably directed towards in the understanding and education of young children.

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A Study of Non-verbal Representation in Young Children

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Abstract of Paper

The paper begins with a discussion of the concept of representational functioning, viewed within a cognitive-developmental framework. The outline and some of the findings of an exploratory study of non-verbal representation are reported. This study involved two samples of 4½-year-old children; one sample was drawn from an "advantaged" population and the other from a "disadvantaged" population. The purpose of the study was to compare the performance of these two groups of children on a series of non-verbal representation tasks. The tasks consisted of: picture-object matchings, spatial arrangements, and structured play situations. The data shows between-group differences, as well as a high degree of variation among individuals. The interpretation of the findings is discussed, and some of the implications for preschool programming are considered.

Distribution of Raw Scores* on Picture-Object Matchings and Spatial Arrangements, for Advantaged (N=16) and Disadvantaged (N=15) Groups

	Picture-Object		Spatial Arrangements	
	Adv.	Disadv.	Adv.	Disadv.
8	X		XXXXXXX	0
7	X	0	XXXX	00
6	XXXXXX		XX	00000
5	X	0000	XX	0
4	XXXX		X	000
3	X	00		0
2	XX	000000		00
1		00		

*Note: Performance on each Picture-Object match was scored correct or incorrect (1 or 0); each S's score indicates performance on total set. Performance on each Spatial Arrangements task was scored correct, partial solution, or incorrect (2, 1, or 0); again, each S's score indicates performance on total set.